Optical Transmission Module PPG



Overview

ADPD144RI (Rev. A) The module combines red and infrared LED emitters, a four segment optical detector, and a mixed signal, photometric front end with digit.

Key Takeaways

A PPG optical transmission module uses LEDs and photodetectors to measure blood volume changes non-invasively, often integrating an analog front end (AFE) for signal processing and data output.

Overview

A Photoplethysmography (PPG) optical transmission module is designed to detect blood volume changes in tissue by emitting light and measuring the transmitted or reflected light intensity. The module typically includes red and infrared LEDs and a photodiode to capture the light after it passes through or reflects from tissue, such as a fingertip or earlobe. The variation in light intensity corresponds to the pulsatile blood flow, producing the PPG signal used to calculate heart rate, SpO2, and other cardiovascular parameters.

Key ComponentsLED Emitters: Red and infrared LEDs illuminate the tissue. The choice of wavelengths allows differentiation between oxygenated and deoxygenated hemoglobin for SpO2 measurement. Photodiodes (PDs): Detect the transmitted or reflected light.

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High-sensitivity photodiodes improve the signal-to-noise ratio (SNR) and enable accurate detection even under ambient light interference. Analog Front End (AFE): Integrated circuits in the module amplify, filter, and convert the photodiode signal to digital form using an ADC. Some modules, like the ADPD144RI, include configurable gain, LED drivers, and digital control for timing and communication via I2C.

Signal Processing: The module processes the AC component of the PPG signal, which corresponds to the pulsatile blood flow, while rejecting DC components from ambient light. Transmission vs.

Reflective Modes

Transmission Mode: The LED and photodiode are placed on opposite sides of the tissue. Light passes through the tissue, and the photodiode measures the transmitted light. This mode is common for fingertips and earlobes and provides high SNR but is limited to thin tissue sites.

Reflective Mode: The LED and photodiode are on the same side of the tissue. Light penetrates the tissue and reflects back to the photodiode. This mode allows placement on various body parts, such as the wrist or forehead, and is more flexible for wearable devices.

ApplicationsPPG optical transmission modules are widely used in: Pulse oximeters for SpO2 monitoring Heart rate and heart rate variability monitoring Blood pressure and cardiac output estimation Wearable health devices due to their low power consumption, compact size, and non-invasive nature AdvantagesNon-invasive and low-costCompact and low-power designHigh accuracy with integrated AFE and synchronous detectionAdaptable to different skin tones and motion conditions with auto LED intensity control In summary, a PPG optical transmission module integrates LEDs, photodiodes, and an analog front end to provide accurate, non-invasive monitoring of cardiovascular parameters, with flexible configurations for both transmission and reflective measurement modes.

Article Content

ADPD144RI (Rev. A)

The module combines red and infrared LED emitters, a four segment optical detector, and a mixed signal, photometric front end with digital control and signal processing in a compact device for optical

PPG Sensor

The SOLUM''s PPG Sensor optical sensor module is designed for seamless integration into compact mobile and wearable devices. Its ultra-low power

EFFECTS OF WAVELENGTH AND SENSOR LAYOUT ON THE

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Photoplethysmography (PPG) is a transcutaneous optical transmission capturing technique for monitoring changes in blood volume to evaluate cardiovascular health. This is achieved with the use

ADPD144RI PPG Optical Sensor Module

Analog Devices ADPD144RI PPG Optical Sensor Module is optimized for photoplethysmography (PPG) detection of blood oxygenation (SpO2). This is achieved by

PPG SIGNAL ACQUISITION MODULE

The PPG signal is quite unstable and any kind of motion artifacts for example head motion without any hand motion while keeping your finger still over the phototransistor introduces some distortion in the

A Hybrid Photoplethysmography (PPG) Sensor System

Photoplethysmography (PPG) is a simple, cost-effective, and non-invasive optical sensing technique for measuring the blood volume changes

A comparative analysis of reflective and transmissive PPG sensor in ...

The transmissive PPG sensor provided clearer pulse features than the reflective PPG sensor. The systolic wave phase showed more fluctuations in the IR and RED reflective PPG sensor.

Photoplethysmograhic sensors, potential and limitations: Is it time for ...

Healthcare is expected to increasingly shift care out of inpatient settings thanks to wearable monitoring systems. Photoplethysmography (PPG) is an optical technique already

Photoplethysmogram

This technique involves extracting features from the PPG waveform and training machine learning models such as linear regression, support vector machines, or

Design and Validation of a New PPG Module to Acquire High

Abstract—A new photoplethysmography (PPG) module is de-signed, optimized, and fabricated in this study to obtain quality PPG signal for high-accuracy bio-sensing. The module contains four light

Explanation of Optical Module Parameters

Considering that some newcomers to optical modules may not understand the letters on the optical module or the specific meanings of the parameters on the optical module, the following is

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ADPD144RI (Rev. A)

OPTICAL COMPONENTS The ADPD144RI is a highly integrated, optical module designed for reflective PPG measurements. The module combines red and infrared LED emitters, a four segment optical

Photoplethysmography in Wearable Devices: A Comprehensive

Photoplethysmography (PPG) is an affordable and straightforward optical technique used to detect changes in blood volume within tissue microvascular beds. PPG technology has found

PPG Sensor System

A PPG sensor can be used in reflection mode (for example on the finger) or in transmission mode (for example on the ear) as shown in Figure 1.1. Normally, a wavelength in the near-infrared is used

SFP Optical Transceiver Modules for Long Distance: A Complete

Discover everything you need to know about SFP optical transceiver modules for long-distance fiber transmission. Compare LX, EX, ZX models and choose the right module for your

Wearable Photoplethysmographic Sensors—Past and

Photoplethysmography (PPG) technology has been used to develop small, wearable, pulse rate sensors. These devices, consisting of infrared light

What is PPG Sensor: Advantages and Disadvantages

A PPG sensor detects changes in blood flow volume using the reflected optical signal from the tissue or its transmission through it. It works on the principle that changes in light intensity are proportional to

A Hybrid Photoplethysmography (PPG) Sensor System Design for

A photoplethysmography (PPG) sensor is a cost-effective and efficacious way of measuring health conditions such as heart rate, oxygen saturation, and respiration rate. In this work,

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